

Epidemiologic Aspects of Abortion in Chile

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THE INCIDENCE of abortion in Chile has increased during the last decades, and abortion is now a major health problem with implications in a number of scientific fields. The majority of studies in the past were based on hospital data, which did not really reflect what happened in the community where the abortion originated. From an epidemiologic viewpoint, little was known about the number of and reasons for abortions, the most vulnerable groups in the female population, or the causes and other features describing the natural history of abortion.

The methods of approach used in several studies in Chile are critically reviewed in some detail. Five major steps were use of available raw data and preliminary studies, studies of abortion as a hospital problem, community retrospective studies, prospective studies, and evaluation of control measures.

Raw Data and Preliminary Studies

We stress the importance, as a first step, of using fully any source of information to make a preliminary assessment. Table 1 shows the trend of abortion in Chile according to hospital admissions. This kind of information can be sought from available sources. Table 2 shows the trend in urban Santiago (population 2.8 million) with the breakdown for each health area. It can be noted that the south health area, with the highest birth and infant mortality

rates, shows a markedly increasing trend. However, the number of admissions for all abortions in 1965 in three areas seems significantly below the expected figure. Raw data must be used with caution because of their many limitations.

Several preliminary studies have been attempted since the early thirties. One of the first was by Matus in 1938 (1). He interviewed 484 women in the wards of a maternity hospital who admitted having had 787 abortions; 234 of these were a reason for their current hospitalization. He also spoke to 816 women admitting a history of 2,115 deliveries and 1,453 abortions (40.7 percent of pregnancies had been terminated by abortion). He also interviewed 140 domestic servants under the Workers Compulsory Insurance Fund (Caja de Seguro Obrero Obl-

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gatorio) who admitted to 152 deliveries and 204 abortions. Apparently, in this particular group 57 percent of pregnancies were terminated by abortion (2).

Romero and Vildósola interviewed 3,038 women admitted to hospitals for delivery or abortion, and those attending the maternity clinics of the social insurance fund (3). They concluded that 26.5 percent of pregnancies terminated in abortion, two-thirds of which were provoked (4). Mena interviewed 1,000 women admitted to hospitals because they had had an abortion and found that 48 percent of pregnancies had ended in abortion, two-thirds of which were from four obstetrical departments in Santiago, and concluded that 52 percent of the abortions were provoked (5). Wal- sen (6) reviewed records of more than 3,000 women admitted for abortion in 1950-54 to one maternity hospital in Santiago. The abortions accounted for 50 percent of the hospital's admissions. Economic reasons and large family were the most frequent explanations given for resorting to abortion.

Although these studies can hardly be described as preliminary, in a way they are because of the bias introduced when hospital statistics or data supplied by studies on other closely related fields which may touch on abortion are used. For example, in the Latin American Center of Demography study on fertility one of four pregnancies in married women terminated in abortion, as did one in three in broken homes or common law unions (7).

A number of other sources of information can be used, such as autopsy findings, legal records, and mortality data studies by social scientists. Although these data can be valuable it carefully interpreted by the health worker, they must be regarded as a useful orientation for further studies which can provide specific answers.

Hospital Studies of Abortion

A study of abortion as a medical care problem in Chile became necessary because of the heavy load it put on the hospitals. It seemed that this approach would be welcomed by medical groups and would be far more appealing to these groups than a community survey.

In 1962 the maternal and child health department of the University of Chile School of

Table 1. Trend of abortion incidence according to hospital admissions, Chile, 1937-64

Year	Number of births	Number of abortions	Abortions per 100 live births
1937-----	153,354	12,963	8.4
1938-----	154,927	13,982	9.0
1939-----	163,589	14,730	9.0
1940-----	166,593	16,254	9.7
1941-----	165,004	18,265	11.0
1942-----	170,222	19,242	11.3
1943-----	172,095	20,009	11.6
1944-----	174,864	19,449	11.1
1945-----	178,292	21,581	12.1
1946-----	175,686	23,619	13.4
1947-----	186,784	24,535	13.1
1948-----	189,236	26,448	13.9
1949-----	189,719	28,514	15.0
1950-----	188,323	29,512	15.6
1951-----	191,332	30,571	15.9
1952-----	195,470	32,862	16.5
1953-----	211,808	33,862	15.9
1954-----	209,920	35,748	17.0
1955-----	225,352	39,340	17.4
1956-----	237,268	41,829	17.0
1957-----	262,746	44,945	17.1
1958-----	262,759	49,041	18.6
1959-----	249,799	49,448	19.8
1960-----	256,674	57,368	22.3
1961-----	269,263	55,435	20.6
1962-----	274,440	53,516	19.5
1963-----	277,144	55,873	20.2
1964-----	275,323	56,391	20.4

Public Health carried out a survey in four general hospitals and four emergency departments in Santiago and in five general hospitals in various provinces (8).

The staff of the department found that abortions accounted for 8.1 percent of all admissions to hospitals run by the National Health Service of Chile throughout the country in the period 1958-60. For each 100 hospital live births, 31 women were admitted for abortion, and for each 100 bed-days for deliveries, there were 24.1 for abortion in the same period. Thus, abortion accounted for 27.3 percent of admissions and 29.4 percent of bed-days. Curettage in complicated or incomplete abortions accounted for 35 percent of the surgical operations carried out in emergency departments. Abortions were the reason for 41.6 percent of all admissions and 26.7 percent of the total volume of blood dispensed. In 1960, the National Health Service spent more than \$1 million in hospital care of women who had had

abortions. In complicated cases, such as those involving sepsis *Clostridium perfringens*, the cost of treating one survivor was around \$3,000.

As Stycos pointed out, this study demonstrated that "abortion complications were expensive and competing for overcrowded bed space and facilities" (9). By March 1962 abortion was no longer a taboo subject and, through studies of abortion as a hospital problem, both health authorities and the medical profession became ready for open discussion. Moreover, the way was cleared for the next and more complex step—undertaking community studies.

Two Community Retrospective Studies

Study 1. In 1961 the department of epidemiology at the school of public health started a study in Santiago intended to provide an epidemiologic description of provoked abortion. A random sample of 1,890 women of childbearing age was interviewed by 35 social workers. Later, with nearly 30 other workers, all nurses, graduate midwives, or medical students, the study was extended to the province of Concepción in the south, and the copper mining province of Antofagasta in the north under a grant from the Population Council, New York City. In all, 3,926 women were interviewed (10).

Following is a summary of major findings.

1. Twenty-three percent of the women had a positive record of abortions, accounting for a total of 2,499 provoked abortions which the women admitted having.

2. Highest incidence rates were found in the 20–34 year age group.

3. High rates were found for married women, those having up to three children alive, and those in the low-income groups.

4. Thirty-one percent of those women undergoing abortions had been admitted to a hospital.

5. In 50 percent of the cases the person provoking the abortion was a graduate midwife. (While standards for graduate midwives have improved in the last decade and training is good, graduate midwives associated with abortion are generally of an older generation. Most of them can be regarded as nonqualified persons.)

6. Economic reasons for seeking abortion were given by almost half the women.

7. Forty-one percent of sexually active women were using some contraceptive, but there were regional variations.

8. Less than 10 percent opposed family limitation on religious grounds.

Study 2. In 1962 the department of preventive medicine of the school, in cooperation with Harvard School of Public Health, started a study within the west health area of Santiago, in a sector comprising a population of 16,000, primarily working class. A random sample of 580 women of childbearing age was interviewed (11, 12). The women reported 2,617 pregnancies, the outcome of which were analyzed.

Following is a summary of relevant findings.

1. The percentage of these pregnancies terminated in abortion was found to be higher than that of study 1.

Table 2. Trend of abortion incidence according to hospital admissions, by health areas, urban Santiago, 1961–64

Area	Number of admissions per abortion					Rates for 1963	
	1961	1962	1963	1964	1965	Births ¹	Infant mortality ²
East.....	4. 545	4. 228	3. 853	4. 296	3. 850	31. 6	54. 9
Central.....	2. 698	3. 387	3. 623	4. 215	3. 522	31. 1	59. 4
South.....	4. 978	4. 883	5. 737	6. 228	5. 822	40. 9	90. 6
North.....	3. 372	3. 929	4. 059	4. 090	4. 301	35. 7	75. 4
West.....	4. 781	3. 828	4. 749	5. 417	5. 898	39. 7	83. 2
Total.....	20. 374	20. 255	22. 021	24. 246	23. 393	-----	-----

¹ Per 1,000 population.

² Deaths in children under 1 year per 1,000 live births.

2. Civil status, schooling, and frequency of sexual intercourse apparently had no bearing on the risk of provoked abortion, but the risk appeared higher for women who were unskilled manual workers and who had unemployed husbands.

3. Abortion rates were higher for Catholic and agnostic women than Protestant women.

4. Among Catholic women, rates correlated with degree of religious fervor as measured by attendance at church services.

5. Abortion seemed to be more frequent as the length of residence in Santiago increased, suggesting the influence of an urban environment.

6. The risk was found to be higher among women using some contraceptive method, most of which were ineffective.

Paradoxically, examination of the apparent discrepancies between the two studies is more fruitful in terms of discussing the methods used. The following differences were noted.

<i>Attribute studied</i>	<i>Study 1 (reference 10)</i>	<i>Study 2 (references 11, 12)</i>
Percent of pregnancies terminated in provoked abortion.	16-----	23
Influence of civil status.	Higher rates for married women and concubines.	No influence.
Socioeconomic level with the higher rates.	Lower-----	Upper

Several explanations for the difference found with respect to the outcome of pregnancy can be postulated. In study 1, for example, 35 social workers held a single 45-minute interview per woman. In study 2 three graduate midwives paid repeated visits to each woman, who was also interviewed by the physician. The difference in technique proved very important. Requena found that the number of abortions recorded and the accuracy of information improved gradually after the second and third visit by the midwife and even more when the physician made a final interview. Repeated interviews culminating in a physician's interview furnished more data than did single interviews by social workers.

However, the apparent discrepancies can be better explained by analyzing the measurements used. The crucial point is the chain of proba-

bilities associated with provoked abortion; that is, for any woman the probability of provoked abortion equals the probability of becoming pregnant times the probability of resorting to abortion.

This leads to calculating two basic rates.

$$\text{Annual incidence rate} = \frac{\text{number of provoked abortions reported}}{\text{number of women of childbearing age}} \times 100,$$

and

$$\text{Outcome of pregnancy} = \frac{\text{number of provoked abortions}}{\text{number of pregnancies}} \times 100.$$

Abortion incidence can be analyzed from a number of viewpoints, according to the purpose of the study. The most commonly used rates and ratios, including two listed by Tietze (13), are summarized on page 46.

Study 1 used mostly a 1-year annual incidence of provoked abortion rate and study 2 used a 3-year outcome of pregnancy rate. This fact accounts for the different findings with respect to civil status, socioeconomic level, and the like, since the two studies are based on a different denominator. There is ample room for discussion about the use and the implications of the two units of measurement. The annual incidence rate, either for women of childbearing age or for pregnant women, allows for comparison of abortion with any other illness risk. By extrapolation it is possible to make a fairly good estimate of the total number of abortions occurring in the community. The measurement of the risk for women according to marital status, social bracket, and the like refers to the denominators existing in the community. Therefore, the annual incidence rate would seem more practical for community studies.

The pregnancy outcome rate has a few limitations. For example, the inclusion of different periods of time for a country having an upward trend of abortions may be misleading. However, a more thorough insight into the problem is obtained when a more specific denominator, pregnancies, is used. Interpretation of findings must be done with caution before drawing conclusions applicable to the entire population.

The two methods of measurement do not conflict. On the contrary, the results obtained can

be usefully compared and, if in agreement, serve to strengthen the evidence found. If the results disagree, analysis of the discrepancies may disclose important clues to substantiate better the evidence found.

Both studies agree in a number of findings. Study 2 found the highest abortion rates for women who had two children alive, which coincides with the concentration of provoked abortions for women having up to three children at the moment of occurrence found in study 1. These observations indicate that Chilean women resorted to provoked abortion as a method for family limitation. Both studies demonstrate the existence of a vulnerable group of women, exposed to repeated abortions, that account for a large proportion of the country's abortion rate.

Prospective Studies

The disadvantages of retrospective studies, particularly with respect to the epidemiology of reproduction in a rapidly changing situation, are well known. Therefore, longitudinal studies over a period of time are likely to provide most valuable data. However, such studies involve expensive administrative machinery to insure a long observation of cases.

One of the practical difficulties is finding a suitable community and facilities for longitudinal observation. We studied the community formed by persons associated with 25 electricity plants, 58 substations, and labor camps of the National Electricity Organization and Company, a major electrification undertaking in Chile. For the purpose of our study, the organization is a closed community of 2,040 staff employees, 4,780 workers, and their dependents. In 1963 the medical department started a program of periodic examinations for nearly 1,500 women to appraise their health conditions and obstetrical and gynecological status and to educate couples about reproduction and family planning.

The women were divided into two categories—dependents of staff and dependents of workers. The two groups did not differ significantly in terms of sexual exposure. However, one out of five women in the worker group and one out of 10 in the staff group was found to

be pregnant. Several features are being analyzed in an attempt to find an explanation for this sharp difference in fertility. Contraceptives were used by only 5 percent in the worker group and 7 percent in the staff group. Analysis of parity and abortions shows that dependents of staff have more abortions than dependents of workers. Workers tend to have larger families, while staff wives tend to limit the size of their families by resorting mostly to abortion and surgical sterilization. After 4 years preliminary results indicate a dramatic increase, to more than 50 percent of the women, in the use of reliable contraceptives with a consistent decline in pregnancy and abortion rates.

Evaluation of Control Measures

The epidemiologic studies on abortion in Chile made a substantial impact on public health activities after the first preliminary report, based on data from the first 580 women interviewed early in 1962 (14), was presented to the Seventh Pan American Congress of Social Medicine. As Stycos points out, "a small bombshell was dropped in 1962" (9). In January 1964 the Chilean Committee of Family Protection became legally a private agency with official and public accreditation and with the prevention of abortion one of its aims. That year the committee started to expand clinical facilities in Santiago and throughout the country. A number of activities continued until 1965 when the National Health Service initiated an official nationwide program. In 1966 the school of public health started a course in demography and health to train senior students from all Latin America.

Up to June 1966, nearly 50,000 women were using intrauterine devices, and a similar number oral contraception pills. The number of hospital admissions in Santiago for abortion declined in 1965. A second survey, financed by a Population Council grant, on a random sample of women should determine if the use of contraceptives reduces the incidence of undesired pregnancies and provoked abortions. The specific aims of the study are to determine the proportion of exposed women using reliable methods of contraception, determine the incidence rates of abortion, and assess the changes

Summary of Rates Commonly Used in Abortion Studies

In these rates the difference between cases and persons must be emphasized. Cases are abortion episodes recorded, regardless of the number of women (one or more abortions per woman a year). Persons are the number of women experiencing one or more abortions during a year, useful in measuring risk.

INCIDENCE RATES

$$\text{Prenatal rate (crude abortion)} = \frac{\text{Number provoked abortions recorded}}{\text{Total population}} \times 1,000$$

Variables	Uses
Age and sex distribution	For comparison with crude birth rate. Limiting factors make it of little use.
Proportion of women of childbearing age	
Frequency of intercourse	
Use of contraceptives and so forth	

$$\text{Prefertility rate (incidence)} = \frac{\text{Number provoked abortions recorded}}{\text{Female population 15-44 or 15-49 years}} \times 100 \text{ or } 1,000$$

Variables	Uses
Age distribution	For comparison with fertility rates. Provides data that can be broken down to analyze variables and to use in cross-analysis of survey data. Useful in public health field studies. Helps identify most vulnerable groups.
Proportion of women exposed	
Frequency of intercourse	
Use of contraceptives	
Marital status	
Socioeconomic groups	
Schooling	
Parity	
Work, religion, and so forth	

$$\text{Outcome of pregnancy rate} = \frac{\text{Number provoked abortions recorded}}{\text{Number pregnancies recorded}} \times 100$$

Variables	Uses
Age distribution	For comparison between specified groups, particularly in prospective studies, and for measuring risk of provoked abortions. If multiplied by pregnancy incidence rate, it equals the prefertility rates.
Socioeconomic groups	
Schooling	
Occupation	
Parity	
Previous abortions	
Religion and so forth	

$$\text{Specific rate for exposed women} = \frac{\text{Number provoked abortions recorded}}{\text{Number women exposed of childbearing age}} \times 100$$

Variables	Uses
Frequency of intercourse	For evaluation of contraceptives in prospective studies. Restricted to sexually active women of childbearing age.
Use of contraceptives	

in the various characteristics of provoked abortion as described in study 1.

The study is planned around direct house-to-house interviews of a random sample of approximately 2,500 women of childbearing age in greater urban Santiago, using the same techniques and the experience acquired in study 1.

Another study (12) is underway in the west health area, population 450,000 persons. During the period May 1-August 15, 1964, a total of

1,526 patients were seen in the clinics; 1,498 women were given a reliable contraceptive, of whom 1,422 received intrauterine devices. Up to August 15, 1964, the women had been observed for 35,696 days or almost 100 woman-years, and during this period three pregnancies had occurred. As of April 30, 1965, a total of 7,230 intrauterine devices had been inserted. The effectiveness of the control measures will be evaluated by comparing results with the findings prior to study 2.

Summary of Rates Commonly Used in Abortion Studies—Continued

MORTALITY RATES

$$\text{Crude death rate} = \frac{\text{Number deaths attributable to abortion}}{\text{Total population}} \times 100,000$$

Variables

Age and sex distribution
 Proportion of women of childbearing age
 Frequency of intercourse
 Use of contraceptives and so forth

Uses

For comparison with other causes of death.

$$\text{Specific death rate} = \frac{\text{Number deaths attributable to abortion}}{\text{Female population 15-44 or 15-49 years}} \times 1,000$$

Variables

Age distribution
 Proportion of women exposed
 Frequency of intercourse
 Use of contraceptives
 Marital status
 Socioeconomic groups
 Schooling
 Parity
 Work, religion, and so forth

Uses

For comparison with other causes, particularly with maternal deaths.

$$\text{Case fatality rate} = \frac{\text{Number deaths attributable to abortion}}{\text{Number cases of abortion recorded}} \times 100 \text{ or } 1,000$$

Variables

Definition of abortion
 Reliability of death certificates

Uses

For determining risk of dying once abortion was provoked.

OTHER UNITS OF MEASUREMENT

Several units of measurement have proved useful in abortion studies. These include (a) abortion ratio per 100 pregnancies—either the ratio per 100 or per 1,000 live births or the ratio per 100 or per 1,000 total births, (b) average number of abortions per woman, (c) proportion of women with a positive record of abortion, (d) proportional incidence ratio, and (e) proportional maternal mortality ratio.

If hospital data are used as the basis for a study, possible units of measurement are (a) number of

admissions attributable to abortion, (b) proportion of admissions attributable to abortion (females over 15 years), (c) proportion of discharges attributable to abortion (females over 15 years), (d) proportion of bed-days used for abortion, (e) average length of stay, (f) average cost per abortion case, (g) proportion of expenditure in medical care of abortion, (h) expenditure for certain specific items, such as antibiotics, blood, surgery, and so forth, and (i) intra-hospital case fatality rate.

We hope to determine whether effective contraception devices and education concerning them will prevent abortions, ruling out whatever other variables which might come into play.

Summary

Several recent studies in Chile point to provoked abortion as an increasing health problem, with the number of abortions exceeding by far what is officially reported. In a 1961-64 study of 3,926 women, those in Santiago interviewed by 35 social workers and those in the rest of the country interviewed by 30 other workers, 23

percent of the women reported a total of 2,499 abortions.

The studies indicate that the 20-34 year age group and a small proportion of women exposed to repeated abortions are particularly vulnerable. Those women exposed to repeated abortions accounted for a third of the total number recorded. Highest rates were found for married women, those having up to three children, and those in low-income groups. Most abortions were provoked by nonqualified persons using risky methods which involved serious danger to the patient.

Economic reasons, conjugal problems, and ignorance of birth control methods appear to

be the basic reasons for the upward trend of provoked abortion.

The epidemiologic picture of provoked abortion points to the urgent need for prevention and replacement of abortion with the use of contraceptives.

Using available raw data and preliminary studies is the first step in studying the problem. Data from such available sources of information, however, should be used cautiously. Studies in hospitals, being more meaningful and appealing to medical groups, should be undertaken as the second step.

The third step, community surveys aimed at describing the nature, magnitude, and distribution of provoked abortion, requires lengthy planning. The two basic rates used in studies are annual incidence rates of provoked abortion

$$= \frac{\text{number of provoked abortions reported}}{\text{number of women of childbearing age}} \times 100,$$

and outcome of pregnancy

$$= \frac{\text{number of provoked abortions}}{\text{number of pregnancies}} \times 100.$$

Community studies can provide a number of useful clues from the public health viewpoint in order to set up a rational abortion prevention program and to explore a number of more specific variables through a prospective study.

Prospective studies, the fourth step, are elaborate and expensive; therefore the population sampled is limited. However, they can provide a better insight into the problem and more refined data, as well as a means for evaluating control measures. The findings also can substantiate data obtained from community surveys.

A fifth step is evaluation of control measures by means of either community surveys or prospective studies aimed at determining

whether or not contraceptive measures prevent abortion.

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